These tracts are at present inhabited by the following tribes:— 1. Warrans, along the coast, from Pomeroon to the Amacura; 2. Arawaaks, intermixed with the former, chiefly at the rivers Waini, Barima, and Amacura; 3. Waikas and Chaymas, sister tribes of the Wacawais, at the upper course of these rivers, and the regions between the Barama and Cuyuni. I estimate the whole number of these nations at 2500. Many of them assist in felling timber or in working on the estates; and if the system which only of late years has been followed, namely, that of treating the Indian as a rational being, in giving him a fair remuneration for his work, shall be generally adopted, the aborigines, there is no doubt, will prove most useful labourers to the colony. It is my full persuasion, that if the attention and paternal provisions which the aborigines of Guiana have of late years enjoyed at the hands of Her Majesty's Government be continued, and means adopted to afford them religious instruction, a relic of the once numerous Indian population may yet be rescued.

BIBLIOGRAPHICAL NOTICES.

Die Pflanze im Momente der Thierwerdung. Beobachtet von Dr. F. Unger. Wien, 1843, pp. 100, with a large quarto plate.

The observations which Dr. Unger made many years since on the peculiar motion of the spores of *Vaucheria clavata*, though questioned by many, have for the most part been received as correct and well-founded. Indeed they have been confirmed more or less by Treviranus, Meyen, Trentepohl, Valentin and others, and the fact is undoubtedly one of the most curious amongst those which have been recorded of apparently spontaneous motion amongst the reproductive organs of Algæ. No one seems hitherto to have ascertained how this motion is produced, with the exception of Dr. Unger, who in the treatise before us has fully described the structure of the cuticle of the spores, which it appears is clothed with short vibratory processes, exactly as in many of the inferior animals, or particular organs or membranes of those of a higher grade. The fact of the existence of such processes in vegetables is not, however, perhaps altogether new to science. Pouchet has described something of the kind in the larger circulating globules in *Zannichellia*, though so imperfectly that the real nature of the processes is not very evident.

We now proceed to give the results of Unger's observations as detailed by himself at the end of his treatise, which we think cannot fail to interest our readers.

1. *Vaucheria clavata*, Ag. (*Ectosperma clavata*, Vauch.) is, considered respectively of all its peculiarities, a plant, which by the union of numerous individuals forms small tufts on the surface of stones in running streams, in the middle of Europe. It consists, when fully developed, of a branched inarticulate tube, 0037th of a Vienna inch in diameter, which continues to grow above, while the lower portions are dead or decomposed, and in this state lives from the end of winter

through spring, summer, autumn and winter till the approach of the new spring.

2. The tube consists of a tender vegetable membrane, whose inner surface is clothed, more or less thickly, with round or elongated particles of hardened jelly involved in chlorophyll, whence the whole plant derives its lively green colour. The rest of the tube is filled with a fluid, somewhat granular, slimy substance, in which, as also in the globules of the chlorophyll, there is no observable motion.

3. Under the due influence of light and temperature a peculiar alteration takes place at the top of the tube and of its branches, which has the closest agreement with the formation of spores in simply constructed plants. There originates—namely, below the tips of the shoots—a transverse dissepiment in the tube, which was at first perfectly continuous. This is very thin, and separates the upper portion of the contents of the tips of the threads from that portion which is below. In this upper part only a new tube is formed out of a colourless, slimy, granular substance within the mother-tube, which is closely pressed to it.

4. The development of this inclosed tube resembles that of other spores in their mother-cells, but it at length attains a higher order of organization*, inasmuch as, instead of being formed of a simple vegetable membrane, it is, in fact, an epithelium with vibrating ciliary processes. At present, however, there is scarcely a trace of organization in the tube itself or its contents.

5. By means of the swelling of the ripe spore simultaneously with the attenuation of the mother-tube, the tube bursts and the spore pushes spontaneously through the narrow aperture, exhibiting at last a revolving motion. This process, which lasts some minutes, may in a certain degree be compared with that of delivery in the animal kingdom.

6. After the separation of the spores the dissepiment expands, and forms a sac within the vacant tube, or a branch is given off immediately below the dissepiment. In either case we have a mere prolongation of the original tube.

7. The same process of formation takes place in the new portion of the original tube, and it is repeated a third time; but as the tube is continually decreasing in diameter, the new spore is proportionally less†.

8. The spore is an oval or elliptic body, which, when liberated from the mother-tube, moves freely in water in every direction and swims about like an animal. An epithelium uniformly clothed with vibrating cilia incloses a slimy substance, which in part assumes the form of vesicular cavities; the epithelium is clothed within with numerous globules which are invested with chlorophyll. At the

* We follow the language of Unger, without however adopting his views altogether as to the animal nature of the spores. See however on this head 'Berk. Gleanings of Brit. Algæ,' under the article *Vaucheria clavata*.—Ed.

† This is perhaps one of the most interesting facts contained in the treatise, and altogether analogous with what Corda describes in the formation of the spores of certain Fungi.—Ed.

lighter anterior portion these green globules are much less frequent than in the posterior portion; so, on the contrary, the vesicular cavities are more numerous in the anterior portion than behind, where they are replaced by globules of chlorophyll. There is no trace of a cytoblast.

9. The motions of the spores are rotatory round their axis major from left to right, and sometimes straightforward; in either case produced by the vibrating cilia. Moments of rest alternate at pleasure with motion, which on the whole continues for about two hours.

10. With the cessation of motion the ellipsoid assumes a globular form; the colour becomes uniform, and the crystalline transparent epithelium changes into a tender, homogeneous, vegetable membrane. In less than twelve hours the bladder elongates at one or two points, which is the indication of germination.

11. The development of the tube proceeds rapidly. On one side a root is formed, by which the plant is fastened, while on the other side the spore elongates, becomes branched, and within fourteen days produces new spores.

12. I do not find any substance which tends to prolong the animal life of these germs. Experiments show that it is very easily destroyed by the weakest dynamic and chemical external influences, and that even the vegetable life is destroyed by them. A temperature from 0° R. to 15° R. is proper to it. A higher temperature is destructive.

Light has no influence in prolonging or shortening the animal life. On the contrary, absolute darkness retards the process of germination, while green light promotes it. Acids, alkalies, salts in the smallest proportions, are destructive; narcotics destroy both the power of motion and germination. A weak electrical stream deranges the motion, a strong one is altogether fatal.

13. The spontaneous motion of the germs of *Vaucheria* is not an isolated fact. A whole series of Algæ (*Zoospermeæ*), as well articulate as inarticulate, have this peculiarity, and it appears from the present observations that the same organization is the cause of the phænomena. Comparative inquiries show that these moveable germs are to be regarded as embryos, which resemble the tetraspores of Algæ*.

14. These germs, regarded on one side only, are not to be excluded from the animal kingdom to which they belong, as indicated by the structure of the skin, the voluntary motion, and their sensibility to outward influence.

15. Neither the absence of mouth or reproductive organs, nor the presence of gum (schleim) and chlorophyll, are contradictory as to their animal nature, since there are animals which do not possess the first, and possessed of parts which otherwise belong to vegetables. Among animal forms the embryos of the lower classes of invertebrate

* The word in the original is *Fucoideen*; but this is evidently a slip of the pen. It should be *Florideen*.—Ed.

animals resemble them most, and indeed, at present, are not distinguishable by any acute characters.

16. We conclude also that the germs of *Vaucheria* and the allied Algæ are animal embryos which cannot raise themselves above this embryonic condition, and after a short existence resume the vegetable nature to which they owed their origin.

Note.—In the number of 'Annales des Sciences Naturelles' for May 1843, M. Thuret has published an interesting memoir on the movement of the spores of Algæ, and has gone over the same ground with Unger, arriving at similar results. He is convinced that a great number of reputed species of *Vaucheria* are mere varieties. There is, however, a portion of his memoir, on a point simply indicated by Unger, which demands the greatest attention, viz. that relative to the motion and structure of the granules contained in the articulations of *Confervæ*, *Chætophora*, &c. In *Conferva* and *Chætophora* he finds the granules furnished at the narrower end with two, or at most three, flagelliform, extremely slender appendages, on which their motion appears to depend, while in *Prolifera* (= *Vesiculifera*, Hassall) there is a circle of appendages. The granules of *Conferva* differ therefore very little from the granules of the red snow, which, if M. Thuret's observations be confirmed, may after all be a vegetable. At least, if it be not so considered, it will be very difficult to deny the animality of the spores of *Conferva*.

Recherches sur la Rubéfaction des Eaux et leur Oxygenation par les Animalcules et les Algues. Par Aug. et Ch. Morren: Bruxelles, 4to, pp. 130. pl. 7.

This work, which has been kindly communicated by the authors, consists of a series of memoirs, of which the first relates to the oxygenation of water by means of Algæ and Infusoria, and the remainder to its rubefaction and the description of various species by which the change in colour is effected. It is the result of observations made by two relations, Augustus and Charles Morren, of whom the former is Proviseur of the Royal College of Angers and a celebrated chemist, the latter Professor of Botany in the University of Liège and an accomplished zoologist.

There is a singular difference in the quantity of air which exists at different times in running and stagnant water, as also in the quantity of oxygen comprised in this air at different hours of the day. The proportion of oxygen varies from 25 to 48 or 61 per cent. from sunrise to 5 o'clock in the afternoon. The subject is obviously of great importance as regards health and in many other points of view, and it is to the consideration of it that the authors have applied themselves in the first memoir. The cause of these differences is found in the influence of light on the respiration of the Infusoria and Algæ which are contained in the water.

The influence of oxygen is very great on the salutary quality of this universal beverage; on the degree of its action on the nutrition of vegetables, and consequently when used for irrigation; nor is it less active as regards the art of bleaching and dyeing. It is easy, from what has been said, to perceive the great importance of the subject, and it is difficult to imagine to what results it may finally lead. In a philosophical point of view we may remark, that it ex-

plains why the Creator has multiplied in such a marvellous degree the animalcules and microscopic plants with which water abounds. Though regarded frequently as objects of disgust and forerunners of disease, they are, in fact, necessary to the general harmony of nature. It is to them we are indebted for the salubrity of waters which would otherwise be injurious*.

We proceed to state the circumstances which led to these investigations, as our readers will easily understand from them the nature of the observations. M. Augustus Morren had analysed the water of a great number of wells and fountains at Angers, and examined the gases which it is capable of containing. He then experimented on that of some neighbouring ponds, and he found that, habitually impregnated with a large quantity of vegetable and animal substances, it held in dissolution, notwithstanding the contact of a perpetually-renewed atmosphere, a gas frequently less rich in oxygen than the water of the two rivers, Maine and Loire, which run near Angers, and even than the water of the wells and fountains of the country.

After the admirable work of Humboldt and Guy-Lussac on Eudiometry, we know that in its normal state the running water of rivers, or distilled water, well aërated, holds in dissolution about a 25th part of its volume of oxygen and azote, in the proportion of 32 of oxygen to 68 of azote. He was then greatly surprised, when, on a fine day in the month of July, having analysed the air extracted by ebullition from the water of a fish-pond, he found that it contained 56 to 58 per cent. of oxygen. This water had a green tint. He repeated the experiment, filtering it carefully to get it free from the colouring matter, but the analysis gave him the same result. The next day he analysed again the air derived from the water of the same pond, taken at different times of the day. In the morning it contained only 25 per cent. of oxygen, towards midday 48 per cent., and at 5 in the afternoon 61 per cent., which was the greatest proportion he ever met with. The volume of air contained was variable, and increased perceptibly with the quantity of oxygen. The quantity of azote remained constant, but the carbonic acid contained in the water varied.

These experiments convinced him that the solar light has an important part in these phænomena, but that it is not the only cause of them. Cold rainy weather succeeded, and the proportion of oxygen was frequently less than 28 per cent. With the return of fine weather the proportion did not exceed 34; but he found that the green colour of the water had disappeared. In the middle of August the water again became green and strongly oxygenated, though in proportion to the light and heat of the sun. The green bodies proved to be *Chlomidomonas pulvisculus*, Ehrenberg.

The oxygenation of water is of course most important for those

* The authors remark, that these relative effects were not even suspected before. This however is scarcely correct. See the remarks of Sir J. E. Smith under *Conf. muralis*, Eng. Bot. tab. 1554.—Ed.

animals which depend upon the proportion contained in it for the purposes of breathing. On three occasions the authors have observed important consequences arise from the extraordinary diminution of the proportion of oxygen, owing to accidental circumstances. At times they have found the proportion so low as 18, 19 or 20 per cent., and the consequence has been the destruction of the greater part of the fish by asphyxia. On the 18th of June 1835, the greater part of the fish in the Maine perished from this cause; and the same circumstance was observed twice in the pond which first directed their attention to the subject of the memoir*.

Their researches into these phænomena led the authors to investigate also the cause of the rubefaction of water, a circumstance which in all ages has excited the attention of the curious, and which has been often regarded as miraculous or ominous. In all cases they have found that it depends on the presence of Infusoria or microscopic Algæ. These researches have given occasion to much interesting discussion regarding the real nature of certain productions which have been referred by authors, according to their peculiar views, to the animal and vegetable kingdom.

Amongst these, the nature of the red snow of the Arctic regions is investigated, and it is satisfactorily proved to be composed of minute animals. The green snow has already been shown by Messrs. Martius and Bravais to be the same thing in a different state. According to them, the granules are red when young, green when old.

When seen in perfection the production is evidently animal, and is identical with *Trachelomonas volvocina*, Ehrenberg. It is furnished with a single oral appendage. When dead it endures for a long time without much sensible alteration or decay, and is then exactly like a true *Hæmatococcus*.

It is impossible for us to give an analysis of every chapter, which would extend to a considerable length. We must content ourselves with thus indicating the nature of the work, and recommending it to the notice both of botanists and zoologists, as affording ample matter for reflection.

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.

April 18, 1843.—The Lord Bishop of Norwich, President, in the Chair.

Read the conclusion of Mr. Griffith's memoir "On the Ovulum of *Santalum, Loranthus, Viscum*," &c.

In this paper, dated "Malacca, March 28th, 1842," Mr. Griffith proposes to supply many of the deficiencies in his two memoirs on the ovula of *Santalum, Loranthus* and *Viscum*, published in the 18th vol. of the Society's "Transactions," to correct some important mistakes, and to extend his inquiries to another genus of the natural family of *Santalaceæ*, viz. *Osyris*. With this view he gives a detailed

* Perhaps the periodical or occasional mortality of the fish in the Mere at Diss in Norfolk, when the Mere is said to be *sick*, may be ascribed to the same cause.—Ed.